RESEARCH PROPOSAL TO CEBAF

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MEASURING THE NUMBER OF PIONS IN THE NUCLEUS

THE HALL A COLLABORATION

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ABSTRACT

The exchange of pions by nucleons inside the nucleus creates a population of constituent pions. The spectral function of this population can be measured in an $(e,e'\pi)$ experiment using quasifree kinematics with excitation above the nucleon resonance region. A longitudinal-transverse separation at low four-momentum transfer helps distinguish pion creation on the nucleon from knockout of the constituent pions. The momentum and binding energy distributions of the pions in the nuclear ground state can be inferred from the coincidence measurement of the missing-momentum and missing-energy spectra. The pion spectral function is connected theoretically to the two-nucleon potential and the low-energy pion-nucleus optical potential.